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ABSTRACT

Aspects of interactive video use in the second language classroom are examined. The major components and equipment considerations for an interactive videodisk and computer system are outlined, including factors in the choice of a system interface. The use and control of interactive video for accessing scenes to be played are described, and suggestions to help teachers use the medium's inherent work-saving capabilities are presented. The discussion concludes with an examination of the limitations of interactive video use, including costs and lack of prepared materials. Three figures illustrate the text. (MSE)

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AN INTRODUCTION TO INTERACTIVE VIDEO

Ulric Chung[1]

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Computers are infiltrating every aspect of modern day life. No longer restricted to purely scientific and business applications, they are being built into everything from automobiles to supermarket cash registers. One notable hybrid system, interactive video, the result of combining a computer with video, promises to have many applications in second language instruction. This article examines this new medium based on work currently under way at the Language Learning Laboratory of the University of Illinois in terms of some general questions: (1) What are the major components of an interactive video system? (2) How does interactive video work? (3) What are its uses in instruction? (4) What are the basic limitations to using it?

THE MAJOR COMPONENTS

Interactive video systems come in many shapes and sizes; however, systems for second language instruction generally consist of a video-tape recorder (VTR) or a laser disk player (LDP) controlled by a personal computer via a hardware interface (see Figure 1). The program running within the computer controls the display of text, graphics, and most importantly, tells the VTR/LDP when to start playing a scene, when to stop, and what kinds of options to use while playing. (The options indicate how the scene is to be played. For example, a scene can be played with the audio turned either on or off to draw attention to the non-verbal behaviors.) The complexity of individual interactive video systems depends on two general factors: the type of video playback device used (VTR/LDP), and the inherent capabilities of the interface card.

The choice of whether to use a VTR or an LDP is important in that both types of machines have benefits and disadvantages which need to be understood by the user. A primary benefit of VTRs is that the technical cost of producing video-taped materials is relatively low, and if necessary, can be done with a minimal amount of equipment. The video tape itself, however, is also the primary drawback, for the constant stress placed on it from playing, freeze framing, rewinding, etc. wears it out and eventually degrades the quality of the picture during playback. Another problem comes from the fact that tape is a serial medium. Therefore, one normally has to wait from a few seconds to several minutes before individual scenes can be located and played.

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Laser disks, on the other hand, can access any scene on the disk with very little waiting time. A scene can be played in slow motion or freeze framed indefinitely, with no damage to the disk. This makes laser disks a very good medium for storing large amounts of information permanently. The primary weakness of laser disks is that with the exception of experimental versions, recordings cannot be made directly on them. A high quality video tape of the material must be made first from which the laser disk will be mastered. The result is that the average person cannot make disks without a lot of costly equipment. Furthermore, changes cannot be made to a laser disk once it has been made.

1. Ulric Chung received his B.A. in the teaching of French and his Master's of Computer Science from the University of Illinois. His Master's project included the design and implementation of an interactive video logging system, which will facilitate the development of interactive video/CAI, and he will be continuing this work as a Visiting Research Associate in the University of Illinois Language Learning Laboratory.

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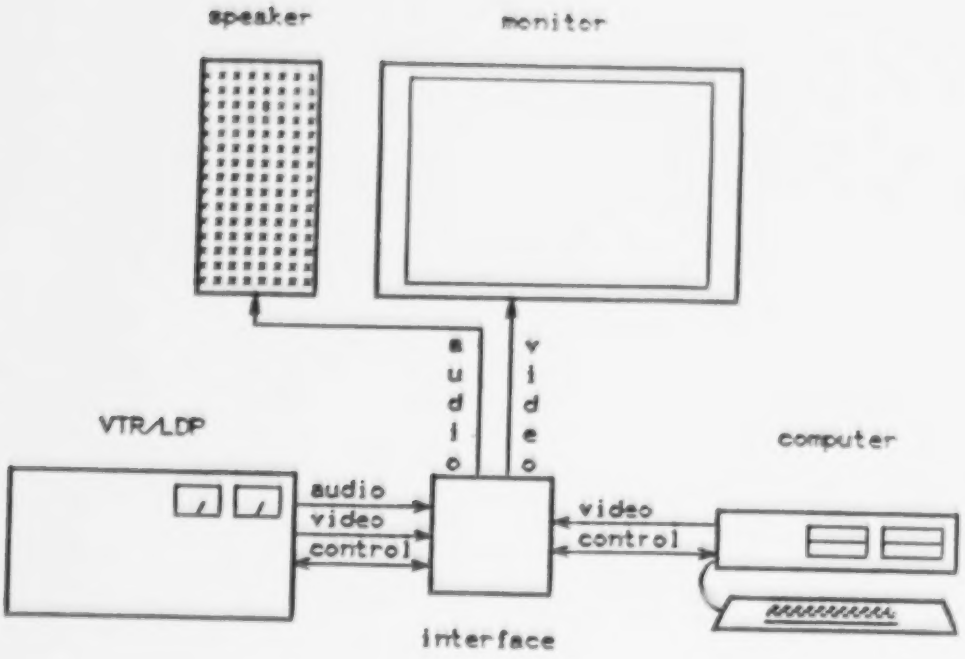

FIGURE 1. Components of an Interactive Video System.

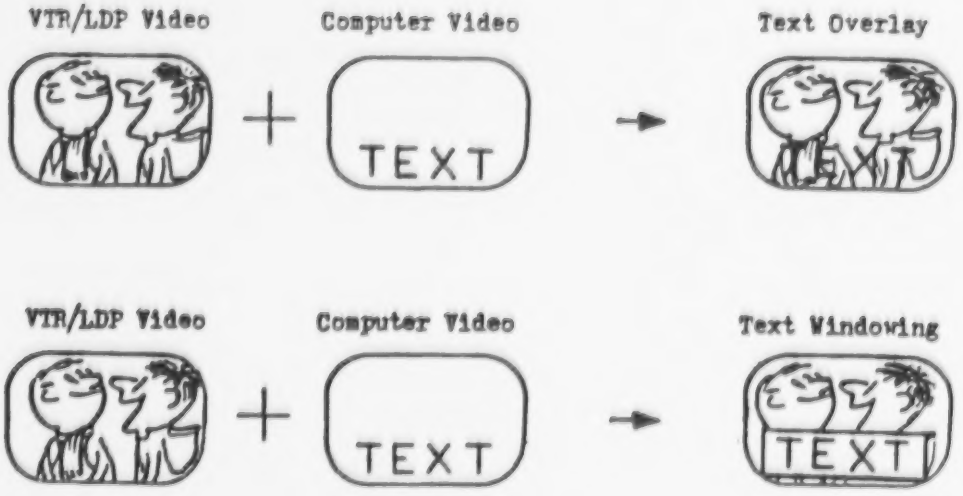

FIGURE 2. Text Overlay Versus Text Windowing.

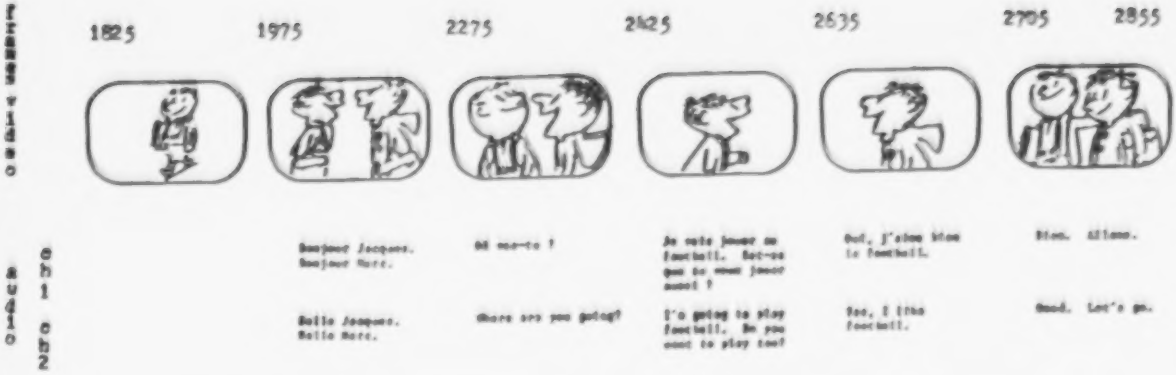

FIGURE 3. Layout of Information Contained on Tape/Disk.

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The second important element influencing the complexity of interactive video setups is the sophistication of the interface used to control the system. Choosing an interface presents us with a "chicken and egg" situation. If one already has a computer and VTR/LDP, then the interface chosen can exploit only the existing features of that system. Hence, the limiting factor of the system is not the interface, but the other components. So, for example, purchasing an interface which controls three channels of audio is wasteful if the video playback device only has two channels of audio available. The preferred alternative is to have a set of predefined needs, so that an interface and equipment can be purchased to fulfill them. Some desirable features of an interface which can help to meet those needs include the ability to

1. control multiple channels of audio
   a. merged together.
   b. as individual channels.
2. present the video picture and computer text
   a. on two separate monitors.
   b. alternated on the same screen.
   c. merged with the computer text over the video (see Figure 2).
   d. merged with one display screen as a window of the other (see Figure 2).
3. output a recordable signal of computer generated text/graphics and VCR/LDP video.
4. terminate a scene during playback.
5. keep the computer active during playback so that the user can type input and have it processed.
6. control either VCRs or LDPs with the same card.
7. utilize *all* the available features of the video machine being used, e.g. pause, slow motion, etc.

The features of an interface have a definite bearing on its price, and also on the overall "power" of the system. For instance, the ability to control multiple channels of audio allows the tape/disk to have one channel with the target language soundtrack, and a second with a translation or a even a commentary. This effectively multiplies the potential uses of the tape/disk by two.

HOW INTERACTIVE VIDEO WORKS

Even though the configurations of systems may vary, the principles making them work are the same. Like film, movement on video is caused by showing a series of still images (frames) in rapid succession to give the illusion of continuous motion. The frames are numbered consecutively, so the beginning and ending points of a hypothetical scene might be 1825 and 2855, respectively (see Figure 3). In order to play this scene, the beginning and ending frame numbers must be sent to the computer as well as any specific instructions for the manner in which the scene should be played. When the locations have been received, the computer checks the VTR/LDP to find out the current position of the tape/disk. The machine will then rewind or fast forward accordingly until it gets to the beginning of the scene. Once the machine has arrived, it will play until the end of the scene is reached.

Using frame numbers directly to play scenes is the most straightforward method of controlling the VCR/LDP. Frame numbers, however, are not inherently meaningful, so in many applications, it is beneficial to use a utility package which will allow the program designer to give meaningful titles to the scenes to be played. The result of using such a utility is a list which serves as a record of the scenes stored.

#	TITLE	START	END	FRAMES	SECONDS
1	complete dialogue	1825	2855	1030	34.3
2	Jacques walking from school	1825	1975	150	5.0
3	Jacques and Marc say hello	1975	2275	300	10.0

4	Jacques asks a question	2275	2425	150	5.0
5	Marc answers	2425	2635	210	7.0
6	Jacques likes soccer	2635	2705	70	2.3
7	Jacques and Marc leave	2705	2855	150	5.0

The program designer can then use the information on the list as an easy reference for accessing scenes. Thus, high-level language statements which use the list information to play a scene might look like the following:

```
CALL PLAY(3)
```

or

```
CALL PLAY_TITLE("Jacques and Marc say hello")
```

In the case of a language like BASIC, the statements would be as follows:

```
1450 LET SCENE_NUMBER = 3
1460 GOSUB 2000 : REM 2000 is the routine to play the scene by its number
```

or

```
1620 LET SCENE_TITLE$ = "Jacques and Marc say hello"
1630 GOSUB 3000 : REM 3000 is the routine to play the scene by title
```

USES OF INTERACTIVE VIDEO IN INSTRUCTION

While it is important to learn the nuts and bolts of interactive video, the primary concern of most teachers will probably be how this technology can be used in the second language classroom. Comparing the innate capability of interactive video with the parent devices, a computer and a VTR/LDP, interactive video can do little more than either of them. The only additional features are that it can locate scenes more rapidly and accurately than if a human were running the VTR/LDP; and, depending on the interface, it can display the VTR/LDP video on the same screen as computer generated text and graphics. What then, if anything, makes interactive video "special"? In order to respond to this question, we must include a component of interactive video which up to this point in the discussion has been ignored, human creativity.

Even though only a few new features are provided by the combined medium, those features, plus the ones basic to video and to the computer individually, can be combined with the ideas of teachers and program designers to form instructional tools which range from simple to innovative.

Two simple applications help the teacher by employing the inherent capabilities of interactive video as a work-saving medium. By using the recording capability of interactive video, much of the tedious programming required in computerized instruction can be avoided with the added benefit of being able to present complicated types of visual information. For example, rather than programming a computer-generated diagram, one can video-tape a drawing of the diagram or record what the diagram actually represents. Instead of typing out a long explanation of a topic which would require many lines of computer code, one can simply record an instructor presenting the explanation, including any helpful visual aids. The computer's job, now, becomes more managerial in nature, where it receives student input, analyses it, and decides on the appropriate scenes to show.

A second simple alternative takes advantage of the system as an organizing and time-saving medium by using the utilities which give scenes meaningful titles. Now the instructor automatically has a permanent record of the contents of the tape/disk. The teacher can then use the same utilities to retrieve any scene by number or by title for playback. Thus, the teacher can locate short video-taped scenes for showing to a class without having to resort to less accurate counter readings.

More interesting, student-oriented applications of interactive video help make viewing video tapes less of a passive task. A dialogue can be presented as the focal point of an instructional program. By judicious control of the presentations by the selective use of audio and screen displays through freeze framing, slow motion, text overlaying, etc., various aspects of the dialogue's verbal and non-verbal content can be highlighted. The computer can then complement the dialogue by presenting explanations of the vocabulary, grammar, and cultural elements. To help the student master the subject matter, the computer can also pose questions about the lesson content, as well as give exercises and tests. This type of presentation is naturally flexible because the computer text and questions can be modified so that the same piece of video tape can be used with students of different skill levels. Beginning students might see a dialogue whose explanations and questions stress learning new vocabulary words, while the same dialogue can be used to teach grammar points and cultural behaviors to more advanced students.

As topics become more complex, one may wish to enhance existing recorded information by combining the video with computer text. This allows the instructor to write transcriptions, translations, or running commentaries of what is occurring on the screen as "subtitles". Because this feature does not actually alter the tape/disk, the subtitling facility can be turned on or off by the student or teacher as needed.

For highly motivated students, the ability to explore recorded scenes gives him/her control over the instruction. The student can view a tape/disk and can stop or pause at will. At this point, the student can get a simple summary of what has occurred on the tape up to that moment, can be asked a question by the computer, or perhaps can even ask the computer simple questions in a who, what, when, where, why, and how format.

LIMITATIONS TO USING INTERACTIVE VIDEO

Interactive video is a challenging medium for developing new ideas. Technically, it is very simple to modify an existing personal computer system to be able to handle interactive video: all one needs to do is find a VTR/LDP and an interface card compatible with the computer and plug everything together. Thus, interactive video sites may become a natural adjunct to existing computer resources in the schools. These sites could be used by individual students, small groups or even by the teacher in class activities. Unfortunately, however, there are two major constraints to the establishment of such sites in educational settings: the price of the hardware and the availability of interactive software.

If we exclude the cost of both the computer and the VTR/LDP, then the interface itself (depending on its sophistication) can range in price from as little as a few hundred to as much as several thousand dollars. Now, considering the price of a very simple computer and VTR/LDP, the price will be increased by at least another three thousand dollars. In school systems with limited budgets, alternative methods of instruction may not be as "high tech" but they would probably be much more cost effective.

The second limitation is due to the lack of instructional materials specifically designed for interactive video. Because of the relative newness of the technology, there are few, if any, established guidelines for developing teaching materials. Also, materials development will most likely be an expensive venture, since it requires the use of video-taping facilities to create the video presentations, and people skilled in instructional design and programming. Thus, before high quality software can be produced, developers will need time to formulate effective instructional techniques, to gather the capital, and to find or train individuals.

On the brighter side, the cost of hardware is bound to fall as the technology becomes more common. Furthermore, with the availability of easy-to-use interactive video authoring systems, teachers will be able to create instructional materials themselves, using their own or commercial video tapes and laser disks.

CONCLUSION

Interactive video is yet another tool which promises to be able to help teachers in their task of improving instruction. Using it provides us a flexible medium for presenting information in novel ways. If this technology does indeed prove educationally effective, hopefully it will become available to all those who want to use it, and to all those who can benefit from its use.